

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
30 August 2001 (30.08.2001)

PCT

(10) International Publication Number  
**WO 01/63534 A2**

(51) International Patent Classification<sup>7</sup>: **G06F 17/60**

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(21) International Application Number: **PCT/US01/05787**

(22) International Filing Date: 22 February 2001 (22.02.2001)

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(25) Filing Language: English

(81) Designated State (*national*): JP.

(26) Publication Language: English

(84) Designated States (*regional*): European patent (AT, BE,  
CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC,  
NL, PT, SE, TR).

(30) Priority Data:  
09/510,098 22 February 2000 (22.02.2000) US

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**Published:**

— with declaration under Article 17(2)(a); without abstract;  
title not checked by the International Searching Authority

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For two-letter codes and other abbreviations, refer to the "Guid-  
ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.



**WO 01/63534 A2**

(54) Title: **MULTI-LEVEL COMPREHENSIVE RISK ASSESSMENT SYSTEM FOR INSURANCE UNDERWRITING**

(57) Abstract:

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1 MULTI-LEVEL COMPREHENSIVE RISK  
2 ASSESSMENT SYSTEM FOR INSURANCE  
3 UNDERWRITING  
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12 Background of the Invention

13 Field of the Invention:

14 The present invention is generally related to risk assessment  
15 systems used in the evaluation of insurable loss exposures and, in particular,  
16 to a comprehensive-risk analysis system capable of performing a multi-level  
17 analysis of exposure based ratings that are site-specific.  
18

19 Description of the Related Art:

20 Insurance of individual properties, specifically including real-  
21 properties and the structures built on those properties, is widely systematized  
22 through cooperative arrangements between agents, property inspectors,  
23 brokers, underwriters, and others. Although these parties provide many  
24 different essential services in the securing and subsequent performance of an  
25 insurance contract, which can be quite variable depending on the  
26 circumstances of any particular loss event, the overall process of determining  
27 and securing the underwriting of an insurance contract is relatively constant.  
28 An agent for a particular insurance carrier or group of carriers evaluates a  
29 property and structure for insurability based on threshold criteria established

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1 by a carrier. These threshold criteria typically involve rather cursory  
2 evaluations of basic discriminating factors, such as size, zoning, and location  
3 with a known exposure to a natural disaster hazard, as well as age, type of  
4 construction, and valuation. Where a property meets or fits within these  
5 criteria for insurability, some greater evaluation of the probable maximum loss  
6 ("PML") is performed to determine an insurance rating, and therefore  
7 premiums to be charged, for insuring a particular property by the selected  
8 carrier. Determining the PML for a property is conventionally treated as an  
9 evaluation of the costs likely to be incurred in response to a particular loss  
10 event. For example, this valuation is typically determined simply as the  
11 replacement cost of restoring a property in the event of a flood or rebuilding  
12 a structure following a fire. An insurance rating is then determined based on  
13 an actuarial analysis of the likelihood of any particular loss event.

14 Computerization of the underwriting process has been employed in a  
15 number of different ways. Various programs have been developed to  
16 automate the application process. Agents have been able to collect property  
17 related information through screening of externally available information into  
18 an electronic application form. Thus, the threshold criteria determined by a  
19 carrier or group of carriers directly identifies the information to be collected by  
20 the agent in initiating the underwriting process.

21 Other programs have been developed to assist in the determination of  
22 whether any particular property is exposed to a natural disaster hazard. Given  
23 a property addresses, typically once converted to latitude and longitude  
24 coordinates, computer systems can evaluate public or commercially available  
25 proprietary topographical map databases to determine if the property is within  
26 a defined natural hazard risk area. Conventional map databases are known  
27 to exist for flood, earthquake, tornado, and other natural disaster risks.

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1           Databases, containing zoning and other building related information,  
2   are also known to exist. In some instances, these databases are developed  
3   and made publically accessible by the governmental agencies responsible for  
4   collecting and disseminating the corresponding information. Typically more  
5   extensively informed proprietary databases of zoning and building related  
6   data also exist and are commercially accessible.

7           The different programs used to access and evaluate the information  
8   contained in these public and proprietary databases are typically dedicated to  
9   the analysis of the corresponding type of retrieved data. Even as between  
10   different databases providing similar information, the scope and detail of the  
11   information produced from these databases conventionally makes any form  
12   of evaluation rather specialized.

13          Conversely, however, the sophistication of the various carriers in  
14   establishing their basic insurability criteria is rather low compared to the level  
15   of information that might be obtained from the detailed analysis of one or  
16   more different databases. This is, at least in part, due to the well-recognized  
17   complexity of even trying to significantly analyze available topographical data  
18   particularly due to the inherent complexity of its presentation from different  
19   databases. Another factor is that the insurance against potential future losses  
20   is inherently a statistical analysis of risk events.

21          The significance of evaluating any particular risk is further distanced by  
22   the pooling of insurance underwriting. The details of any particular loss is of  
23   little consequence in comparison to the overall or averaged risk exposure of  
24   a large insurance pool. Indeed, complex systems of analysis exist to evaluate  
25   the portfolio risk exposure of insurance pools to particular loss events.  
26   Management of risk exposure at this level, though significant computerization  
27   and detailed analysis is often utilized, occurs independent of the location of  
28   any particular insured property.

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Consequently, there is a need for a system capable of autonomous operation that is able to effectively provide a comprehensive risk-analysis suitable for identifying qualifying underwriters of insurance and generating an insurability rating for a specific property and attendant structures.

6 Summary of the Invention

7           Thus, a general purpose of the present invention is to provide a  
8     comprehensive risk-assessment system supporting the identification,  
9     qualification, and rating for a particular property.

10 This is achieved in the present invention by providing a system,  
11 executable by a general purpose computer, that includes a plurality of risk-  
12 modeling software engines, a model data conversion engine, and a rating  
13 evaluation engine. Risk-modeling software engines provide for the evaluation  
14 of respective property loss risk factors to generate model result data based on  
15 a site-specific description of a predetermined property. The model data  
16 conversion engine stores a plurality of insurability profiles that define respective  
17 sets of predetermined loss risk-factor base criteria, with each of the insurability  
18 profiles corresponding to an insurance source. The model data conversion  
19 engine is coupled to receive the model result data and is operative to select a  
20 qualified insurance source by providing for the adaptive conversion and  
21 comparison of the model result data against the sets of predetermined loss  
22 risk-factor base criteria to select a predetermined insurance source. The rating  
23 evaluation engine, coupled to receive the model result data and the  
24 predetermined insurance source, then autonomously generates a site-specific  
25 insurability rating for the predetermined property based on the model result  
26 data.

27           An advantage of the present invention is that comprehensive, site-  
28   specific risk assessments of the potential damages incurred by a property can

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1 be autonomously generated. The risk assessments are of a quality and nature  
2 that insurance protection for these potential damages may also be  
3 autonomously secured.

4 Another advantage of the present invention is that it manages  
5 underwriting profiles and autonomously provides for the selective mapping of  
6 the risk assessment data to these underwriting profiles to identify and fully  
7 qualify a specific property for insurance by a particular insurance carrier.

8 A further advantage of the present invention is that the present invention  
9 provides for the autonomous interpretation of the generated risk assessment  
10 data in order to determine whether the threshold acceptability criteria of a  
11 particular underwriting profile, having some particular if not unique  
12 qualification requirement, is met.

13 Still another advantage of the present invention is that the quality and  
14 nature of the risk assessment data supports multiple levels of refinements to  
15 the acceptability criteria, permitting carriers to offer their underwriting services  
16 based on different and better risk assessments of the potential loss associated  
17 with a particular property.

18 Yet another advantage of the present invention is that the risk  
19 assessment data is generated and fully valid on a site-specific basis. The risk  
20 assessment data generated for individual hazards is actuarially valid within a  
21 statistical scope that is defined by a specific property and the nature of the  
22 hazard. Consequently, dependencies between or shared in the modeling of  
23 individual hazards does not change the validity of the risk assessment data  
24 produced.

25 Still another advantage of the present invention is that the risk  
26 assessment data provided by multiple, independent hazards models can be  
27 collectively processed to generate fully integrated risk assessment data that

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1 reflects the potential combined loss and damage factors that define the  
2 exposures of a particular property.

3 A yet further advantage of the present invention is that utilization of the  
4 system implementing the present invention allows identification and selection  
5 of the most cost-efficient and protections-appropriate insurance coverages for  
6 a specific property. Changes in the underwriting profiles and in any of the  
7 underwriting ratings can be autonomously detected and used to initiate or re-  
8 initiate the ranked selection of underwriting profiles for a specific property.  
9 Upon notification, the insurance beneficiary of a property can perform an  
10 essentially, if not actual, one-click acceptance and binding of a new or revised  
11 insurance contract.

12

13 Brief Description of the Drawings

14 These and other advantages and features of the present invention will  
15 become better understood upon consideration of the following detailed  
16 description of the invention when considered in connection with the  
17 accompanying drawings, in which like reference numerals designate like parts  
18 throughout the figures thereof, and wherein:

19 Figure 1 illustrates multiple different systems for performing property  
20 risk analysis and underwriting, including a system implementing a preferred  
21 embodiment of the present invention;

22 Figure 2 shows an initial, site-specific hazards risk analysis and  
23 presentation system for a preferred embodiment of the present invention;

24 Figure 3 shows a detailed, site-specific hazards risk analysis,  
25 presentation and underwriting system for a preferred embodiment of the  
26 present invention

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1       Figure 4 provides a detailed view of the system and process of  
2       developing detailed, site-specific hazards risk analyses convertible to  
3       underwriter specific property assessment profiles;

4       Figure 5 provides a detailed view of the system and process of  
5       developing ratings data based on site-specific underwriting parameters; and

6       Figure 6 shows a process of binding an underwritten risk protection  
7       policy based on a site specific analysis of property hazards.

8

9                               Detailed Description of the Invention

10       For the preferred embodiment, the present invention provides for the  
11       comprehensive assessment of risks for a defined property and attendant  
12       structures in connection with the selection of an insurance carrier and the  
13       binding of insurance for the defined property. The autonomous operation and  
14       comprehensive function of the present invention allows an ordinary individual  
15       client-user to access the implementing computer system, identify a potentially  
16       insurable property, and obtain an initial evaluation of the risk factors that may  
17       or will affect the insurability determination and insurance rating of the  
18       property. The invention further permits and supports the election to  
19       automatically select one or more qualifying underwriters and develop the  
20       corresponding insurance ratings for the property for consideration by the  
21       client-user. Finally, the present invention enables the client-user to qualify for  
22       and fully bind an insurance contract against any carrier selected by the client-  
23       user.

24       As generally illustrated in Figure 1, a number of systems 10 may be  
25       accessed by a client-user computer system 12 through a communications  
26       network 14. This network 14 may be a proprietary wide-area or point-to-point  
27       connection and, preferably in relation to the preferred embodiment of the



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1 present invention, is a secure network connection established over the Internet  
2 14 or other similar public wide-area network.

3 In the case of a proprietary underwriting system 16, the client-user is  
4 typically an agent or broker. This client-user operates, directly or indirectly, a  
5 computer system 18 to execute a proprietary software application 20 to collect  
6 specific information required by a specific insurance carrier. A private  
7 database 22 is typically used in connection with the application 20 to screen  
8 against a proprietary set of risk factors before accepting an application for  
9 insurance. The agent/broker must not only provide the specific information  
10 required by the application in the specific form and format required, the  
11 system 16 is typically capable of only providing a print-out of the qualified  
12 insurance application. The services of the agent/broker are still required in  
13 order to complete the underwriting process.

14 Other prior art computer systems, such as the computer system 24  
15 directly support the process of actually binding the insurance contract. A  
16 computer system 26 executes a proprietary application 28 that again operates  
17 against a private database 30 to support the preparation of an electronic  
18 application for insurance. As before, the application 28 requires the specific  
19 property-related information to be supplied in a specific form and format. As  
20 a qualified processing system employed by or on behalf of a particular carrier  
21 or group of carriers, the informational requirements of the application 28 are  
22 predefined. The application is therefore unable to accept property information  
23 that is in a form or format that is any different from that defined by the  
24 application 28. Nonetheless, where the required information can be provided  
25 in an acceptable form, and that information meets the requirements of the  
26 insurance carrier – that the property is insurable – the application 28 is then  
27 capable of operating 32 as a binding agent by identifying a corresponding

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1 insurance rating and, if accepted, committing the binding of the insurance  
2 contract 34.

3 The system 24 is not, however, autonomous. The client-user is  
4 conventionally required to be an agent or broker in order to interface with or  
5 operate the system 24. This high level of sophistication is required to ensure  
6 that appropriate information be collected and provided to the system 24 as  
7 necessary to meet the rigid data requirements of the application 28.

8 The present invention, as represented in the system 36, includes a  
9 computer 38, preferably configured as a Web server, that executes an  
10 application 40 that autonomously functions to implement a comprehensive risk  
11 assessment system capable of evaluating potentially insurable risks in regard  
12 to an identified property. The application 40 is preferably a combination of  
13 programs including an HTTP server, a set of modeling engines, and servlets  
14 that operate to establish access to local and external databases 42, 44, 46, to  
15 communicate with various binding authorities 48 capable of securing 50  
16 payments and to overall integrate these programs into the application 40.  
17 Since the operation of the application 40 is autonomous, as enabled by the  
18 present invention, there are no significant restrictions or requirements placed  
19 on the client-user. Thus, a conventional Web enabled client computer system  
20 12 with access through the Internet 14 is sufficient to fully utilize the system 36.

21 Referring now to Figure 2, the preferred implementing process of the  
22 present invention provides for an initial analysis of the risks, potential for  
23 insurability, and likely insurance rating of an identified property. This process  
24 is preferably implemented through the execution of the application 40 by the  
25 computer system 38. Through an initial property disclosure interaction 62, a  
26 client-user 12 preferably provides an identification of a property by entry of a  
27 fully qualified address, the type of structure to be insured, such as house,  
28 condominium, or apartment, the size of the structure, preferably in terms of

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square footage, the age of the structure, and the structural foundation type. Some unique identification of the client-user is also obtained. Based on this information, a client-user record is created and stored in a user database 64 that is proprietary to the system 38. The collected information is then provided to a hazards evaluation engine 66.

In a preferred embodiment of the present invention, the hazards evaluation engine 66 may include any number of different specialized risk modeling engines 68-86. These individual engines 68-86 are preferably implemented as software components with well-defined data input requirements and produce equally well defined sets of risk data. The particular features and content of the risk data produced by any particular engine 68-86 is highly dependant on the nature and operation of the particular software engine.

The individual engines 68-86 can be generally categorized as those that operate to model the risk exposure to specific loss events (Loss Event), those that support the operation of the risk specific models (Support), and those that provide additional information used to qualify the risk assessments provided by the risk specific models (Qualification). Table I summarizes a preferred set of the software engines 68-86.

Table I – Hazard Engine Components

	<u>Model</u>	<u>Primary Model Parameters</u>	<u>Type</u>
1.	Wind	Frequency, nature, severity of tornados, hurricanes, and other wind driven damages.	Loss Event
2.	Quake	Frequency, nature, severity of earthquakes.	Loss Event

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	<u>Model</u>	<u>Primary Model Parameters</u>	<u>Type</u>
1	3. Fire	Frequency, nature, severity of fires due to human and natural causes; exposure to fires spread from surrounding property.	Loss Event
2	4. Flood	Frequency, nature, severity of floods and other damages due to water on the land surface; proximity to flood plain, dams, other water channels.	Loss Event
3	5. Map Information	Topographical information based on coordinates; hazard zones.	Support
4	6. Geographic Coding	Conversion of property address to property boundaries to coordinates.	Support
5	7. Environment	Nature and proximity of environmental hazards.	Qualification
6	8. Zone	Industrial, commercial, residential, other; construction density; composition of structures.	Qualification
7	9. Crime	Frequency, nature, severity of incidents and impact to structure and occupants.	Qualification
8	10. Replacement Costs	Cost valuation based on zoning and structural construction requirements	Qualification

10 In a preferred embodiment of the present invention, the initial property  
 11 disclosure information is processed through the geographic coding engine to  
 12 identify the property in an unambiguous coordinate system. This siting  
 13 information, along with the available information describing the structure  
 14 located at that site, is then provided directly to the loss event engines as  
 15 discrete input data. That is, the siting information is specifically not  
 16 aggregated by value, geographic rating area, zone or other general  
 17 qualification factors. The siting information is similarly provided discretely to

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1 the qualification engines. The information generated by the qualification  
2 engines is therefore based on or determined relative to the specific site and  
3 structure being analyzed.

4 The loss event engines initialize their software models using the siting  
5 and structure data. Additional input data is obtained, as needed, from the  
6 qualification engines. Other data that is used in the modeling operation is  
7 stored in databases dedicated to the particular engines. For example, the  
8 quake engine 70 preferably locates the site relative to known faults and  
9 models out the likely frequency and severity of particular fault ruptures. As  
10 part of this analysis, the quake engine 70 relies on information obtained from  
11 the map information engine 76 to physically locate known faults relative to the  
12 target site and to determine distances between the target site and specific  
13 faults. For example, the map information engine 76 may provide data  
14 identifying the Alquist-Priolo fault hazard zones, which can be used to simply  
15 determine whether the target site is inside a known fault rupture area.

16 Other data directly accessible by the quake engine 70 includes soils  
17 data and data describing geologic formations that may exist at the target site  
18 and near faults. This other data is preferably used to determine the geologic  
19 nature of the site, such as the underlying soil type and responsiveness to  
20 earthquake motions, and the earth materials that extend between the target  
21 site and different selected faults, which may amplify the shaking level  
22 experienced at the target site in response to any particular event.

23 The quake engine is thus capable of providing a wide range of detailed  
24 output information specifically concerning the target site. This information  
25 preferably includes: (1) the soil type at the target site; (2) distance from the  
26 site to the closest known fault; (3) name of that closest fault; (4) distance from  
27 the site to the closest known controlling fault, which is the fault that presents  
28 the greatest threat of damage to the target property, (5) magnitude of largest

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1 event expected on the controlling fault within a defined period of time; (6) the  
2 mean shaking level at the target site expected in response to an event on the  
3 controlling fault; (7) multiple statistics on the expected damage level that will  
4 be incurred by the structure on the target site in response to an event on the  
5 controlling fault; (8) multiple statistics on the probabilistic damage level for that  
6 will be incurred by the structure on the target site as a result of all events on all  
7 known faults; and (9) the distance from the target site, fault name, magnitude  
8 of the largest expected event, and the shaking level at the site from the largest  
9 expected event for each of the ten closest faults. In a similar manner, each of  
10 the individual hazard engines 68-86 operate on the basis of a particular  
11 coordinate location of a particular property. The site-specific nature of the  
12 information used by any of the engines 68-86 and, in turn, finally generated  
13 by at least the loss event engines 68-74 is maintained through out the  
14 operation of the hazard engine 66.

15 The detailed and site-specific information produced by the hazard  
16 engine 66 of the present invention is processed through a model data  
17 conversion engine 90. This engine 90 operates initially to process the data  
18 generated by the hazard engine 66 into a compiled data set 92 that can then  
19 be evaluated by an underwriting engine 94 and a rating engine 96. This  
20 compiled data set 92 is also preferably stored in the user database 64 for  
21 subsequent reference in connection with the client-user record.

22 In the preferred embodiment of the present invention, the underwriting  
23 engine 94 stores and operates over a set of underwriting profiles that establish  
24 the base criteria of different carriers for the issuance of particular insurance  
25 policies. The model data conversion engine 90 interoperates with the  
26 underwriting engine 94 to match and filter the detailed data produced by the  
27 hazard engine 66 to produce data sets whose information maps to the  
28 particular criteria of the underwriting profiles. Thus, where a particular profile

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1 criterion could not be directly resolved by reference to the detailed information  
2 generated by the hazard engine 66, in accordance with the present invention,  
3 a matched and filtered data set contains the relevant data in a form that can  
4 be directly evaluated against the profile criteria. For example, a particular  
5 carrier's insurability profile criteria may require that the target property not be  
6 subject to a shaking level of greater than a specific value on a defined  
7 earthquake shaking scale, such as perhaps 8.5 on the Modified Mercalli  
8 Intensity (MMI) scale. The criteria may also require that any structure on the  
9 property have a "Grade-Y" rating, in the carrier's defined terminology,  
10 reflecting a likely level of damage at the threshold shaking level.

11 In a preferred embodiment of the present invention, the quake engine  
12 70 may directly produce a shaking level value using the same shaking scale  
13 specified in the insurability profile. Other shaking level values on other scales  
14 may also be produced for potential use in regard to other profiles. Also, the  
15 quake engine 70 may generate one or more different characterizations of the  
16 percentage likely damage for the structure.

17 While a direct correspondence between the shaking criteria of the  
18 insurance profile and the data produced by the quake engine 70 exists, no  
19 direct data correspondence exists for determining whether the structure meets  
20 the "Grade-Y" rating profile requirement. The model data conversion engine  
21 90, in accordance with the present invention, not only identifies the particular  
22 shaking data that is to be considered against the insurability profile, but also  
23 provides for an acceptable conversion between an appropriate, or closest  
24 comparable, percentage damage characterization produced by the quake  
25 engine 70 and the carrier's particularly defined damage rating scale.  
26 Depending on the complexity of the conversion, the definition of the  
27 conversion for any particular carrier may be implemented as a simple business

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1 rule or a complex expert system process, operating from a database 98 of  
2 conversion rules and data, defined in regard to particular carriers.

3 With the production of the matched and filter data sets by the model  
4 data conversion engine 90, the underwriting engine 94 performs a series of  
5 insurability criteria profile comparisons to identify any qualifying carriers. The  
6 identification of the qualified carriers and the data sets are then provided to a  
7 rating engine 96. Based on the data sets, the proposed insurance premiums  
8 for the different carriers are produced. This production, at this point in the  
9 operation of a preferred embodiment of the present invention, is of estimated  
10 premiums, since the information provided by the user in the initial property  
11 disclosure 62 is generally insufficient to fully describe the property and  
12 structure that is proposed for insurance.

13 The qualifying carriers and the proposed premiums are compiled  
14 together 92 with summary explanations of the hazards identified through the  
15 execution of the hazard engine 66. This compiled information is then  
16 preferably presented to the client-user as a preliminary results display 100.

17 The risk assessment of a given property, including the evaluation of the  
18 potential insurability and rating of the property, as described to this point is  
19 preferably presented as a free public service accessible over the Internet 14 to  
20 any client-user 12. A continuation of that process, as generally illustrated in  
21 Figure 3, is preferably subject to the payment of a fee for the development of  
22 a comprehensive risk assessment and presentation of a formal quote for  
23 insurance. The requirement of a fee is, however, not essential, but rather  
24 merely preferred as a method of covering the cost of third-party services  
25 desired or required by insurance carriers in order to complete an application  
26 for insurance. This fee is preferably waived where a qualified application for  
27 insurance is submitted for binding.



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1 If the client-user indicates, from the preliminary results display 100, that  
 2 a formal quote for insurance coverage is desired, the client-user is presented  
 3 with a detailed property disclosure screen 112. The client-user is directed to  
 4 enter, in the preferred embodiment of the present invention, a full identification  
 5 of the client-user, at least sufficient to enable an electronic funds transfer to  
 6 cover the fee, and a detailed identification of the property presented for  
 7 insurance. This identification is preferably sufficient to establish the specific  
 8 nature of the property and any structure to be covered by insurance.  
 9 Additional information regarding the condition, surroundings, and construction  
 10 of the structure, as well as past insurance coverage and claims made can be  
 11 obtained as part of the detailed property disclosure. Thus, in a preferred  
 12 embodiment of the present invention, the property identification is preferably  
 13 obtained through a generalized set of questions, such as shown in Table II:

14

15

Table II – Detailed Property Description

16		<u>Question:</u>
17	1.	What company provided your previous homeowners insurance policy?
18	2.	What was the policy number of that policy?
19	3.	What is your occupation (applicant's)?
20	4.	What is your spouse's occupation, if applicable?
21	5.	Will you occupy the dwelling on the property as your only primary residence within 10 days of inception of coverage?
22	6.	Does more than one family occupy the dwelling(s) on the property?
23	7.	Is there a thermostatically controlled heating system?
24	8.	Is there a Jacuzzi®/hot tub, spa or pool? If so, are they fenced?
25	9.	Is the dwelling more than 1,000 feet to a fire hydrant?

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	<u>Question:</u>
1	10. Is the dwelling more than 60 years of age?
2	11. Are pressurized hot and cold water pipes copper?
3	12. Does the dwelling have copper wiring on all circuit breakers?
4	13. Does dwelling have smoke alarms?
5	14. Is roof/dwelling well maintained in good condition and premises free of debris?
6	15. Has insured reported any claim in the past 3 years? If yes, explain the type of loss and amount paid by insurer.
7	16. Has any damage remained un-repaired from previous claim and/or any open or pending claim?
8	17. Does the insured own or board any animals?
9	18. Is the dwelling located in or near brush/forested area?
10	19. Is the dwelling located in or near landslide area?
11	20. Is the dwelling now or within the past 60 days been in foreclosure?
12	21. Are abandoned, not operational, not regularly used vehicles, or company vehicles stored on the property?

13

14           The information collected through the detailed property disclosure is

15 compiled 114 and associated with the user record as stored in the user

16 database 64. In a preferred embodiment of the present invention, this

17 compilation 114 of the property data is checked and supplemented 116 by

18 accessing public databases 118. The information compiled by public

19 assessors, which is often available electronically, contains property

20 information, often including specific property tract metes and bounds, lot size,

21 and easement data, structure information, including building age, construction

22 type, zoning, and occupancy data. Other information, such as title and

23 foreclosure status, can also be checked 116 and used to supplement the

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1 detailed property disclosure information that is compiled 114 for a particular  
2 property.

3 Commercial services 120, 122 are available to be checked for  
4 particular information to complete the detailed property disclosure 112. These  
5 services may include a claims history database service 120, which allows the  
6 insurance and claims history for a particular property to be checked. Other  
7 services 122 may be accessed to check the credit worthiness of a particular  
8 applicant for insurance. The fees for using these commercial services are  
9 preferably charged to the insurance applicant through the execution of an e-  
10 commerce transaction with a credit card transaction clearing service. As  
11 before, the information obtained through these services, as well as the details  
12 of the credit card transaction are stored in the user database 64 in connection  
13 with the user record.

14 The information compiled 114 through the detailed property disclosure  
15 process of the present invention is quite detailed and substantially beyond, in  
16 many respects, the level of detail required by commercial underwriters for the  
17 conditional binding of an insurance policy. Conventionally, the binding is  
18 conditioned on an inspection of the property through a manual review of the  
19 relevant property records and, in many instances, an actual physical property  
20 inspection. This inspection represents a significant, though perhaps indirect,  
21 cost to the insurance carrier. While the present invention is fully supportive of  
22 the current underwriting practices in regard to the need for detailed property  
23 inspections, the present invention also supports a more detailed initial property  
24 evaluation that is capable of substantially if not completely eliminating the  
25 records review portion of conventional property inspections.

26 Thus, in support of current underwriting practices, the data compiled for  
27 a particular property, including the previously collected and model data  
28 converted hazard data sets, are submitted to an underwriting engine 126 to

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1 formally qualify the target property and structures against the underwriting  
2 criteria of the insurance carriers known to the underwriting engine 126. The  
3 identity of the qualifying carriers and the compiled property information  
4 relevant to determining carrier specific insurance ratings for the target property  
5 is then preferably passed to the ratings generation engine 128. Conventional  
6 ratings qualifications, such as the presence of smoke detectors and sprinklers,  
7 the type of building foundation, and age of the structure, are evaluated in a  
8 conventional manner to produce insurance ratings for the property in respect  
9 to each of the identified insurance carriers. The resulting rating information  
10 is then again added to the compiled 114 property information. A formal  
11 quote from one or more carriers is then preferably displayed 130 to the client-  
12 user. Alternately, an explanation of why the target property is not insurable is  
13 displayed 132 to the client-user.

14       Where the substantially greater detailed information compilable by the  
15 present invention is to be used, potentially to reduce or eliminate the need for  
16 a manual property records inspection or, perhaps of greater significance, to  
17 greatly increase the accuracy and comprehensiveness of the property risk  
18 assessment and, therefore, the accuracy and reliability of the ultimate  
19 insurance rating of the property, a hazards re-evaluation 124 may be  
20 conducted using the full compiled set of property information obtained through  
21 the detailed property disclosure process. The hazards re-evaluation 124  
22 preferably entails a resubmission of property and structure related data to the  
23 hazard engine 66. Thus, in comparison to the earlier presented example, the  
24 quake engine 70 is provided with more detailed information regarding the  
25 property and structure, which allows a more detailed modeling of the likely  
26 damage that will be caused by any particular level of shaking. The detailed  
27 information provided as part of the re-evaluation preferably includes whether  
28 the structure is of single or multi-story construction, the remediated age of the

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1 foundation and structural shear walls, and the percentage or portion of the  
2 structure that may have been reconstructed by choice or building code  
3 requirement. This additional detailed information allows the quake engine 70  
4 to produce a significantly more accurate projection of the maximum likely  
5 damage to the structure in response to a quake. Similarly, the compiled  
6 detailed property information allows the wind, fire, and flood model engines  
7 68, 72, 74 to greatly increase their accuracy in projecting damages.

8 In accordance with an alternate embodiment of the present invention,  
9 the accuracy of the comprehensive risk assessment may be substantially  
10 increased by co-evaluation of the risk assessments produced by the individual  
11 hazard engines 68-74, in combination with the information provided by the  
12 support and qualification engines 76-86. That is, the probable maximum loss  
13 arising from any particular loss-event is preferably determined from both  
14 primary and secondary hazard events. The primary hazard event is  
15 considered to be the direct cause of the loss-event and is likely the direct  
16 source of the largest component of the probable maximum loss for the loss-  
17 event. In this embodiment, secondary hazards either caused by or occurring  
18 as a consequence of the primary hazard are also evaluated to determine  
19 corresponding secondary aggregate contributions to the probable maximum  
20 loss due to the loss-event.

21 This aggregating risk analysis can therefore provide a very accurate  
22 assessment of the risk exposure for a carrier in underwriting the insurance for  
23 the target property and structure. The specific performance of the aggregate  
24 risk analysis is highly subject to the detailed hazard assessment data produced  
25 by the individual hazard engines 68-86. Preferably, a rules based modeling  
26 system or other expert system is utilized to examine and evaluate different risk  
27 scenarios to determine different likelihoods of loss. Exemplary scenarios  
28 include:

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1           1. Considering the potential loss effects of flood hazards combined  
2 with environmental hazards by evaluating the effects of different flood levels  
3 and flood circumstances on known environmental hazard sites based on  
4 proximity and elevation relative to a target property, thus permitting the  
5 identification and risk analysis of the potential and nature of any toxic  
6 contamination of the target site during flood events.

7           2. Considering the potential loss effects due to distant environmental  
8 hazards by evaluating topographical elevations, proximity, surface gradients,  
9 soil types, and geologic formations relative to a target property as the basis for  
10 determining the risk exposure to groundwater contamination in wells on the  
11 target property.

12          3. Considering the potential loss effects due to fault ruptures in  
13 combination with other ground failures, such as landslide and liquefaction,  
14 further potentially in combination with the proximity and nature of  
15 environmental hazard sites in the vicinity of the target property, thus permitting  
16 a comprehensive analysis of the loss risk due to any particular quake event.

17          4. Considering the potential loss effects due to the target property  
18 being exposed to multiple hazards, such as (a) both a brush-fire hazard and  
19 a ground failure hazard, thereby enabling evaluation of an enhanced potential  
20 for a landslide following a brushfire; and (b) fault rupture and fire hazards,  
21 qualified by building types, structure density, and proximity to brushlands or  
22 commercial/industrial structures, thereby enabling evaluation of an enhanced  
23 potential for an urban-wildland or industrial district conflagration following a  
24 quake due to broken gas utility pipelines.

25          The process operation 140 of the different levels of risk assessment  
26 provided by the present invention are generally illustrated in Figure 4. For  
27 current underwriting practices, here denominated a level-one analysis, the  
28 compiled data 114, including the previously generated hazard engine model

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1 data converted data sets, is supplied directly to the underwriting engine 126.  
2 For a level-two analysis, the compiled data 114 is again provided to the  
3 hazard engine 66 for re-evaluation 124. The resulting detailed hazard  
4 descriptive information is provided to the model data conversion engine 90.  
5 Based on the different insurance profile criteria stored or accessible through  
6 the underwriting engine 126, the model data conversion engine 90 again  
7 develops model data converted data sets based on the hazard engine  
8 produced model data. These data sets preferably differ from the previously  
9 generated data sets in that they contain additional information that may at  
10 least be optionally considered in the operation of the underwriting engine 126  
11 to determine the acceptability of the target property for underwriting. This  
12 additional information is also provided to and is more likely to be considered  
13 significantly in the operation of the ratings generation engine 128. In  
14 particular, the ratings generation engine 128 may utilize this additional  
15 information specifically in the process of identifying so-called insurance  
16 surcharges, which are represented as insurance premium add-ons used to  
17 adjust the base premium rate or rating for the property for specific  
18 characteristics of the property or structure to be insured.

19 For a level-three analysis, the hazards data produced through the re-  
20 evaluation 124, other compiled data, and model data converted data sets are  
21 made available to an aggregate hazard model engine 142. This engine 142  
22 implements the rules-based or expert systems engine that performs the  
23 aggregate hazards analysis in accordance with the present invention. The  
24 aggregate analysis results is again provided to the underwriting engine 126,  
25 preferably in the form of the model data converted data sets and extended  
26 data that may be used by the underwriting engine 126 and ratings generation  
27 engine 128.

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1           In connection with each level of analysis, the ratings generation engine  
2   128 operates to generate formal insurance ratings for each underwriter  
3   considered. As generally illustrated in Figure 5, the process of obtaining  
4   ratings information may and, in preferred embodiments of the present  
5   invention, does involve accessing information from any of a number of  
6   potential sources. The determination of whether additional information is  
7   desired depends on the particular underwriters identified and knowledge of the  
8   different information access channels that are available to the ratings  
9   generation engine 128. Conventional insurance standard ratings schedules  
10   152 may be locally accessible by the ratings generation engine 128. The  
11   ratings generation engine may be provided with access 154 to publically  
12   available ratings schedules, provided either by the different carriers or public  
13   agencies that monitor the activities of particular carriers. The ratings  
14   generation engine may also have access to third-party commercial services  
15   156 that, through subscription arrangements both specific carriers and their  
16   agents and brokers, provide detailed digests of the ratings information for  
17   those specific insurance carriers. Some insurance carriers may also offer  
18   access to their own computer systems, specifically to obtain rating information,  
19   by supporting trusted middleware systems 158 or direct connections through  
20   proprietary interfaces 160. Finally, if not currently available now, insurance  
21   carriers may in the future provide their ratings schemes or schedules to  
22   qualified agents and brokers in a well-defined standard form, such as XML  
23   distributions, for use by their agents and brokers. These distributions 154 are  
24   preferably available electronically through repository sites or directly from sites  
25   operated by the different carriers.

26           Regardless of the particular channel used to obtain the ratings  
27   information provided by specific insurance carriers, the ratings generation  
28   engine 128 preferably utilizes the property identification, related data sets, and



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1 any additional information provided, as in the case of the level-two and level-  
2 three property evaluations, to generate a corresponding insurance rating for  
3 the target property and structure. This information, as well, as the information  
4 generated from the underwriting engine 126, is compiled 114, stored in the  
5 user database 64 relative to the user-client record, and then presented as part  
6 of the formal quote display 130.

7 For the preferred embodiment of the present invention, the final binding  
8 process 170 for the target property is shown in Figure 6. From the formal  
9 quote display 130, the client-user is able to select a particular insurance policy  
10 for purchase 172. Upon confirmation of the policy selection and  
11 determination to purchase, a conventional online-credit transaction is initiated  
12 to obtain the funds necessary to secure the binding of the insurance. The  
13 selected carrier is notified 178 of the binding and provided with the  
14 corresponding application for insurance. Confirmations of the credit  
15 transaction, the application for insurance, and of the at least conditional  
16 acceptance of the application for insurance are then mailed or otherwise  
17 transmitted 176, such as by electronic-mail, to the client-user and insurance  
18 carrier. Finally, a hard-copy of the insurance policy will also typically be  
19 provided 180 to the client-user by the insurance carrier.

20 Thus, a system and method of providing for the comprehensive analysis  
21 of the risk exposure associated with a target property, and a system and  
22 method of autonomously evaluating the risks presented as the basis for the  
23 underwriting of insurance for those risks has been described.

24 In view of the above description of the preferred embodiments of the  
25 present invention, many modifications and variations of the disclosed  
26 embodiments will be readily appreciated by those of skill in the art. It is  
27 therefore to be understood that, within the scope of the appended claims, the  
28 invention may be practiced otherwise than as specifically described above.

Claims

- 1           1.     A system, executable by a general purpose computer system, for  
2     generating a comprehensive risk assessment for a property in response to an  
3     identification of the property, said system comprising:
  - 4                 a) a hazard evaluation engine, including a plurality of hazard  
5     loss-event modeling engines, that is responsive to a site identification of a  
6     predetermined property, said hazard evaluation engine generating detailed  
7     hazard model data;
  - 8                 b) an underwriting engine, including a plurality of insurability  
9     profiles, for selecting an insurance carrier corresponding to a predetermined  
10    insurability profile based on comparable data matches between said detailed  
11    hazard model data and said plurality of insurability profiles; and
  - 12                c) a model data conversion engine, responsive to said detailed  
13    hazard model data and operating over said insurability profiles, for identifying  
14    partial and comparable data matches between said detailed hazard model  
15    data and said plurality of insurability profiles, said model data conversion  
16    engine further providing for the selective conversion of predetermined hazard  
17    model data to convert predetermined partial data matches to comparable data  
18    matches.
- 1           2.     The system of claim 1 wherein said hazard evaluation engine  
2     includes loss-event modeling engines, support data engines, and qualification  
3     data engines, wherein said support and qualification data engines provide  
4     site-specific information derived from a property identification provided to said  
5     hazard evaluation engine, and wherein said detailed hazard model data  
6     provided by said loss-event modeling engines is site-specific.

1           3.     The system of claim 2 wherein said model data conversion  
2     engine further provides for the aggregate evaluation of said detailed hazard  
3     model data such that said conversion of partial data matches to comparable  
4     data matches utilizes detailed hazard model data derived from the operation  
5     of a plurality of said loss-event modeling engines.

1           4.     The system of claim 2 wherein said model data conversion  
2     engine operates over said detailed hazard model data as provided from said  
3     loss-event modeling engines and said qualification data engines in the  
4     conversion of partial data matches to comparable data matches.

1           5.     The system of claim 3 wherein said model data conversion  
2     engine operates over said detailed hazard model data selectively in response  
3     to said insurability profiles in determining said conversion of partial data  
4     matches to comparable data matches.

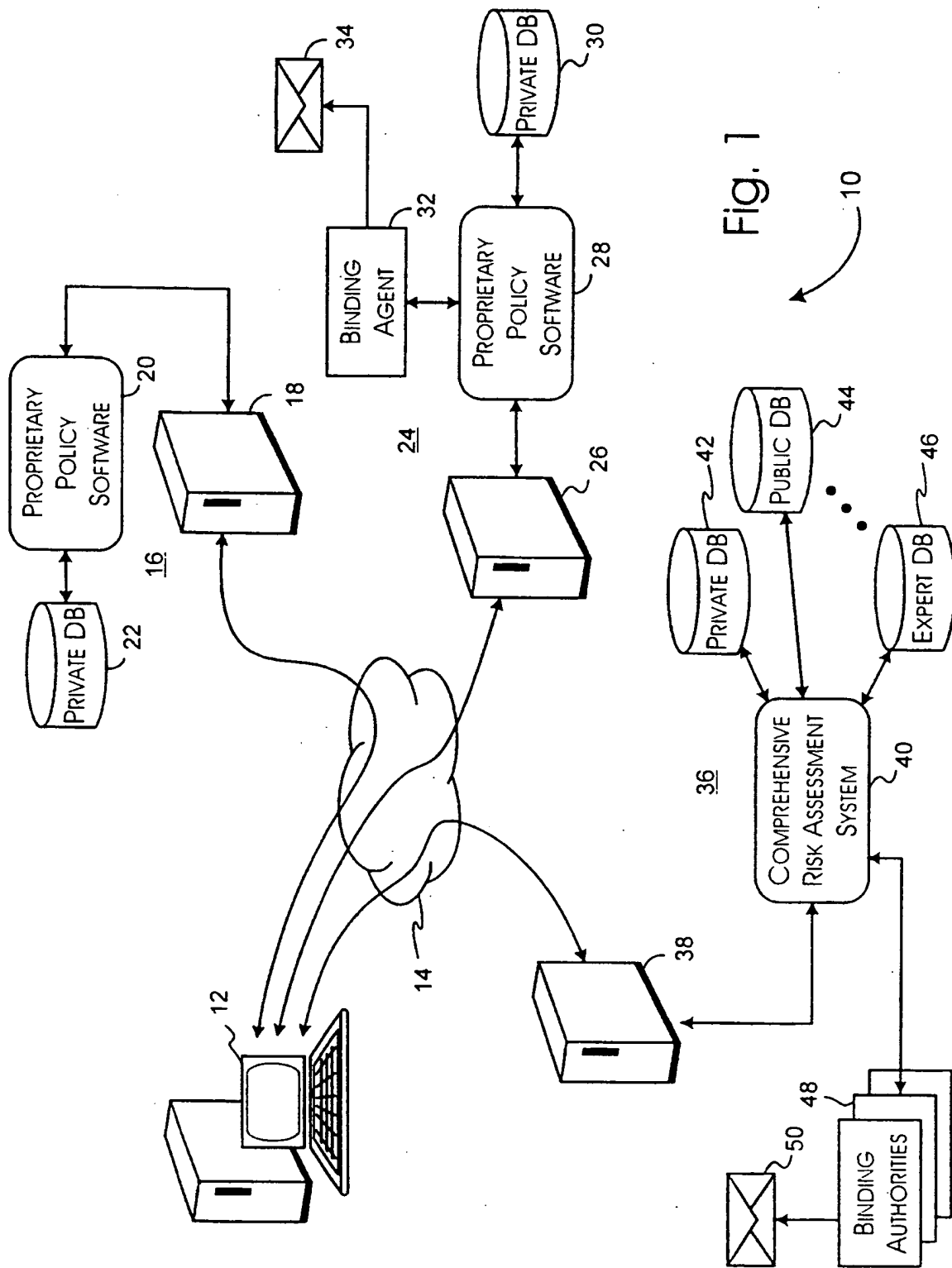


Fig. 1

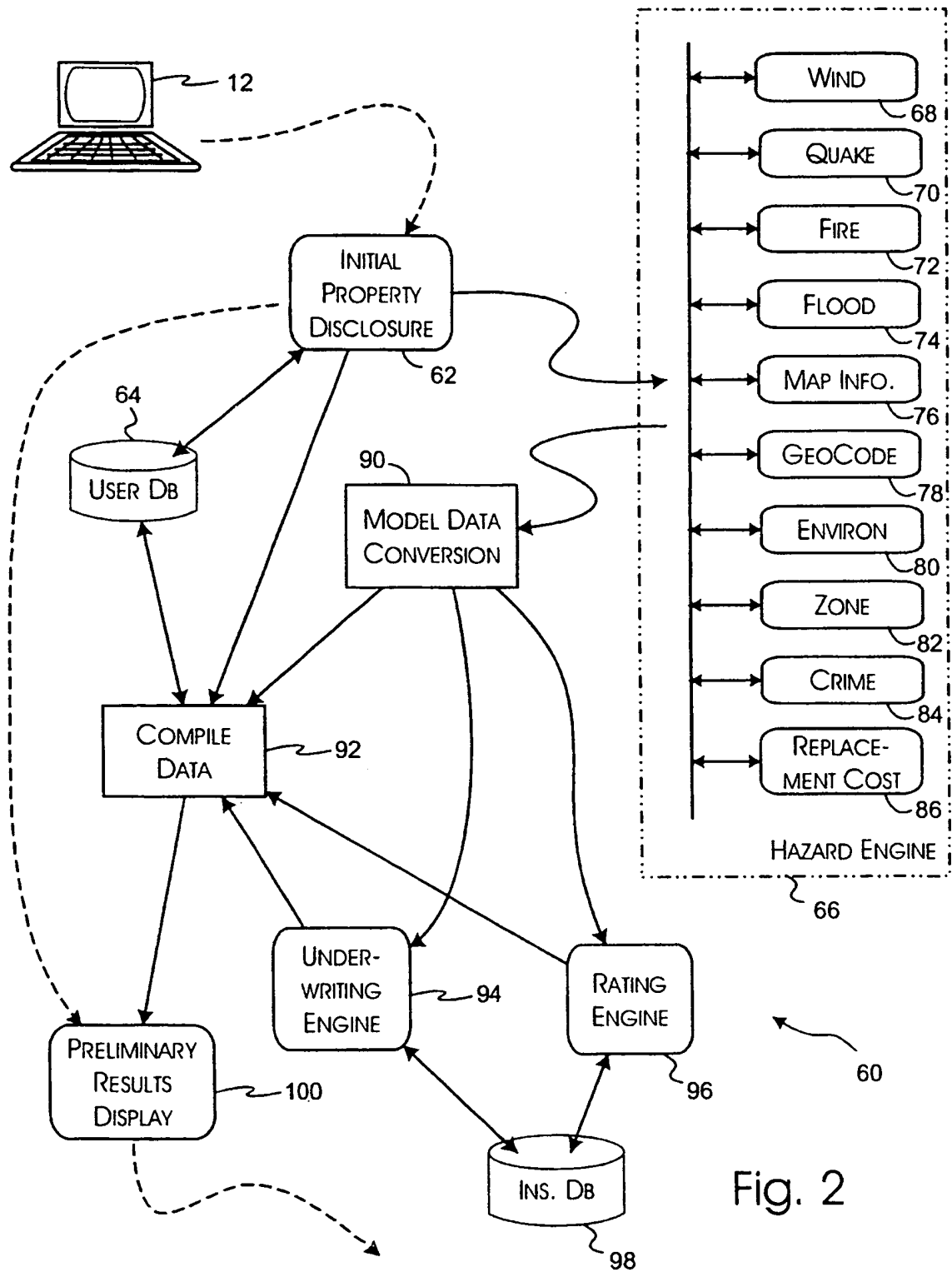
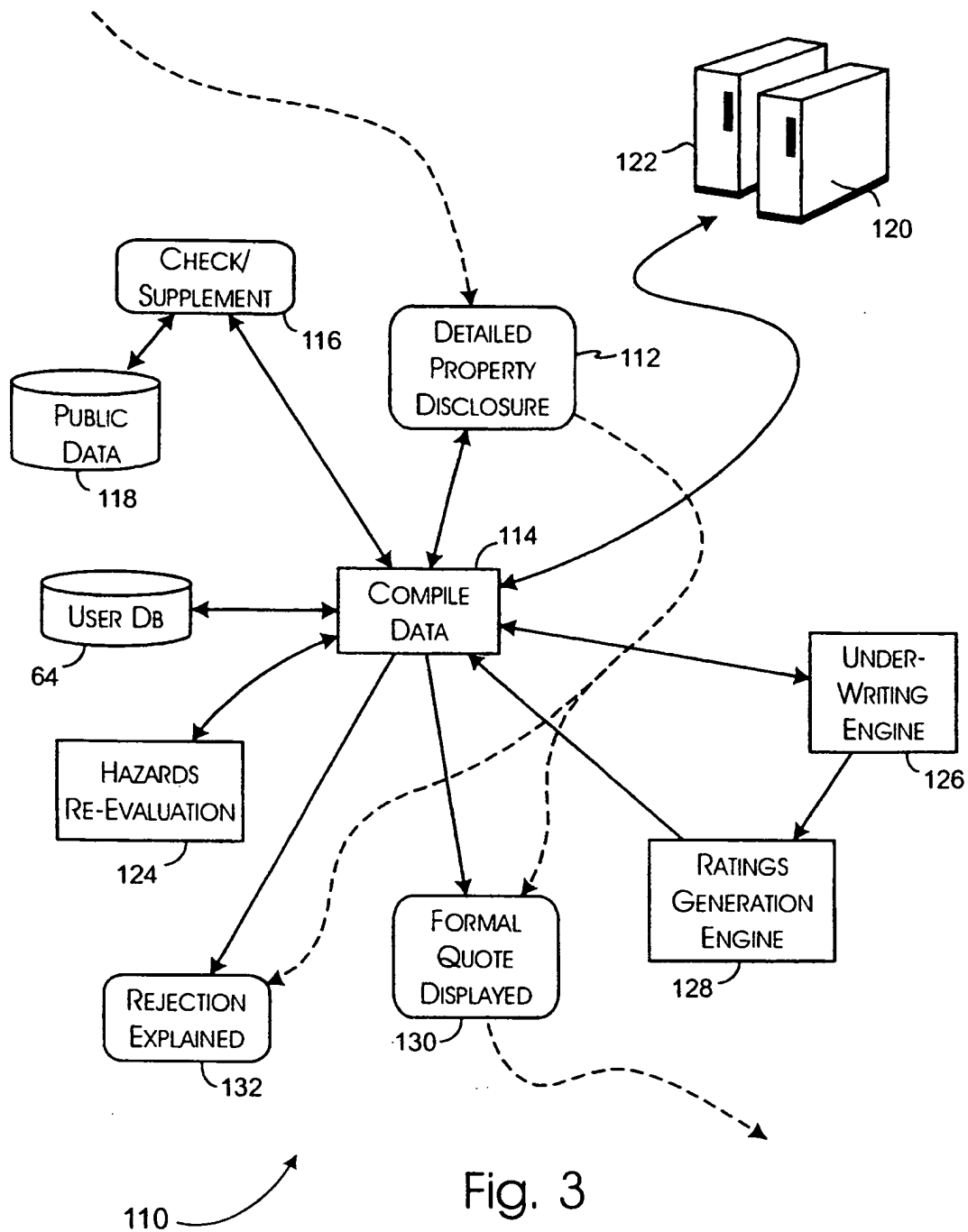


Fig. 2



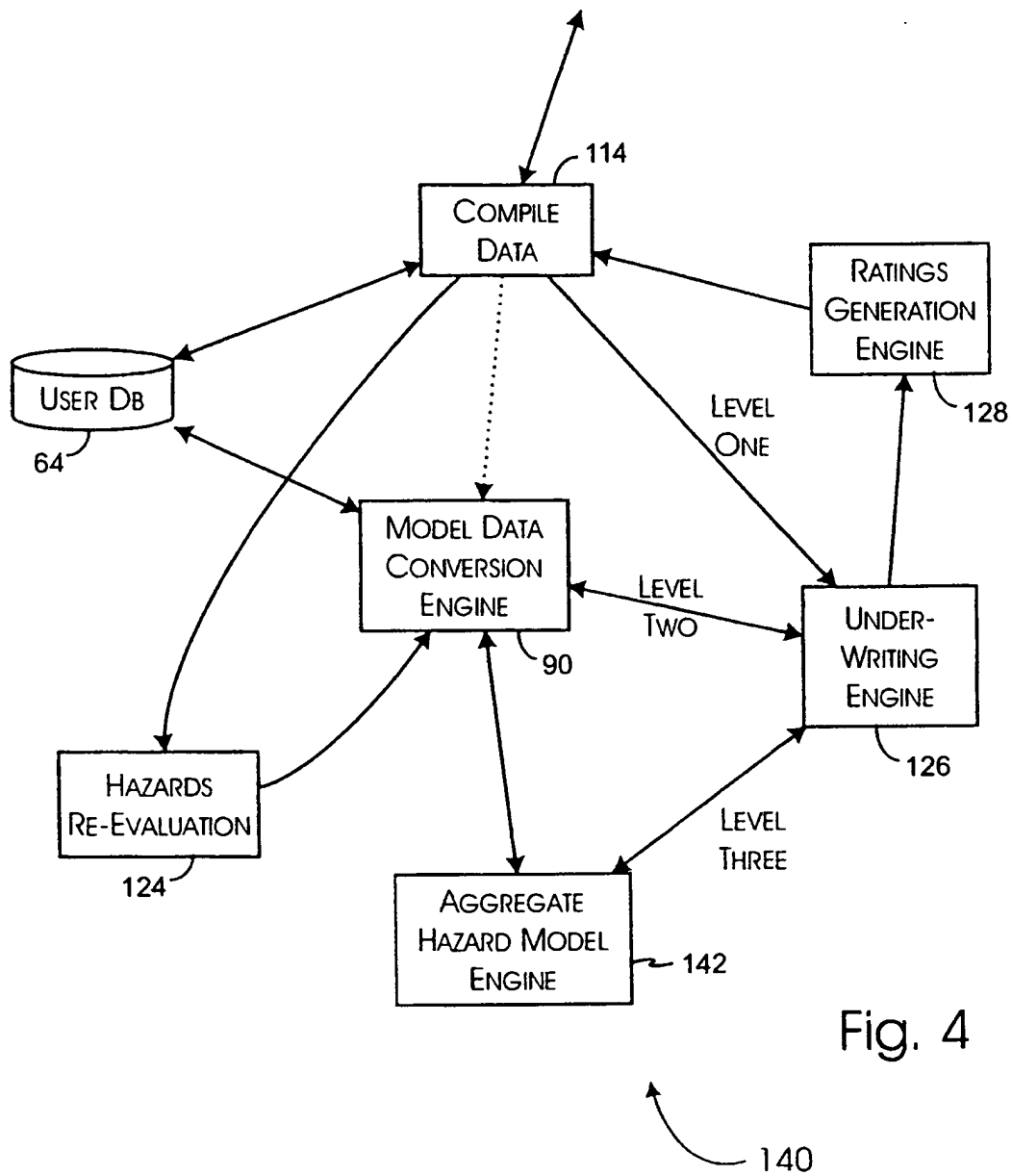


Fig. 5

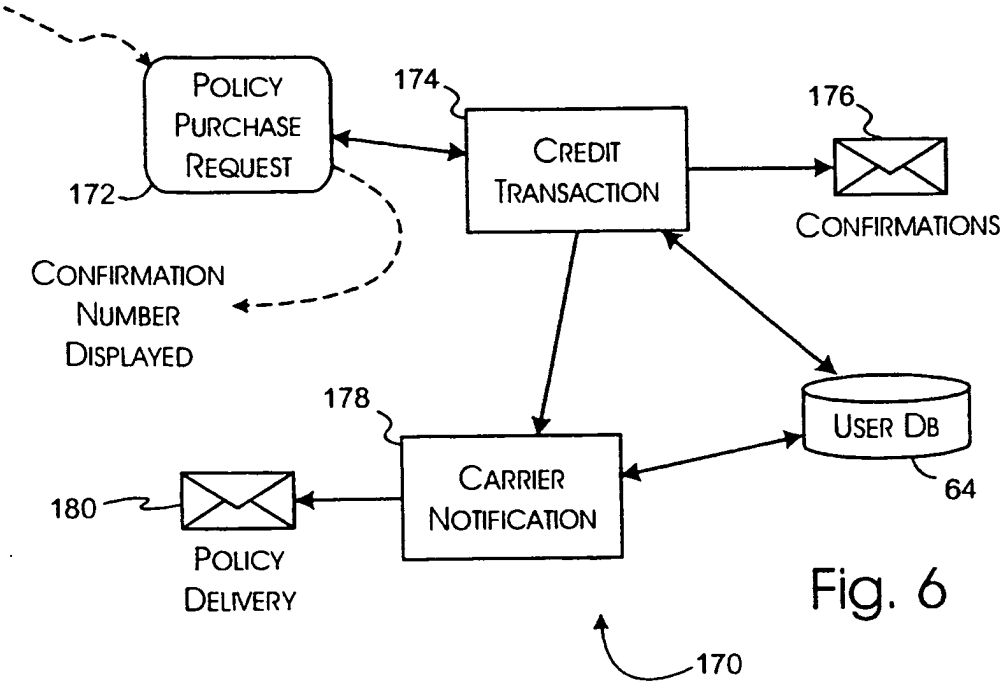
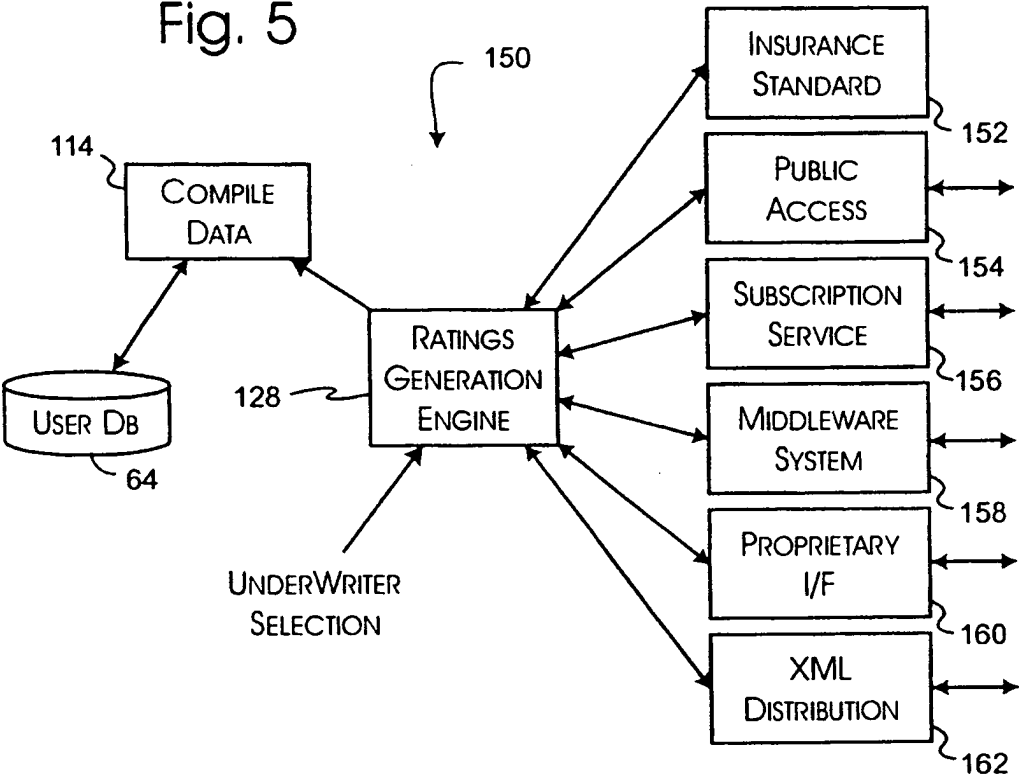


Fig. 6



## PATENT COOPERATION TREATY

## PCT

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## DECLARATION OF NON-ESTABLISHMENT OF INTERNATIONAL SEARCH REPORT

(PCT Article 17(2)(a), Rules 13ter.1(c) and Rule 39)

Applicant's or agent's file reference <b>HRSK3001WO</b>	IMPORTANT DECLARATION	Date of mailing(day/month/year) <b>12/06/2001</b>
International application No. <b>PCT/US 01/ 05787</b>	International filing date(day/month/year) <b>22/02/2001</b>	(Earliest) Priority date(day/month/year) <b>22/02/2000</b>
International Patent Classification (IPC) or both national classification and IPC		<b>G06F17/60</b>
Applicant <b>EQE INTERNATIONAL, INC.</b>		

This International Searching Authority hereby declares, according to Article 17(2)(a), that no international search report will be established on the international application for the reasons indicated below

1. ☒ The subject matter of the international application relates to:
- a. ☐ scientific theories.
  - b. ☐ mathematical theories
  - c. ☐ plant varieties.
  - d. ☐ animal varieties.
  - e. ☐ essentially biological processes for the production of plants and animals, other than microbiological processes and the products of such processes.
  - f. ☒ schemes, rules or methods of doing business.
  - g. ☐ schemes, rules or methods of performing purely mental acts.
  - h. ☐ schemes, rules or methods of playing games.
  - i. ☐ methods for treatment of the human body by surgery or therapy.
  - j. ☐ methods for treatment of the animal body by surgery or therapy.
  - k. ☐ diagnostic methods practised on the human or animal body.
  - l. ☐ mere presentations of information.
  - m. ☐ computer programs for which this International Searching Authority is not equipped to search prior art.
2. ☐ The failure of the following parts of the international application to comply with prescribed requirements prevents a meaningful search from being carried out:
- ☐ the description      ☐ the claims      ☐ the drawings
3. ☐ The failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions prevents a meaningful search from being carried out:
- ☐ the written form has not been furnished or does not comply with the standard.
- ☐ the computer readable form has not been furnished or does not comply with the standard.
4. Further comments:

Name and mailing address of the International Searching Authority  European Patent Office, P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer <b>Mar'a Rodr'guez Nõvoa</b>
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## FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 203

The subject-matter claimed relate to a conventional system for performing a business method. Although these claims do not literally belong to the method category, they essentially claim protection for a commercial effect. The International Searching Authority considers that searching this subject-matter would serve no useful purpose. It is not at present apparent how the subject-matter of the present claims may be considered defensible in any subsequent examination phase in front of the EPO as International Preliminary Examining Authority with regard to the provisions of Article 33(1) PCT (novelty, inventive step); see also Guidelines B-VII, 1-6).

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examining Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guideline C-VI, 8.5), should the problems which led to the Article 17(2) declaration be overcome.